

WE CLAIM:

1. A system for adaptively controlling communications channels in a wavelength division multiplexing (WDM) optical network that performs wavelength selective switching, the system comprising:

a wavelength and route manager (WRM) that determines a communications channel to be set up to satisfy a request for service between two network elements (A and B) using:

a channel selection algorithm that uses at least one rule abstracted from a physical constraint on signal transmission through the optical network to select at least one wavelength for providing the communications channel between A and B; and

a constraint-based route validator for verifying that the at least one wavelength is viable; and

means for effecting the setup of the at least one wavelength between A and B to provide the communications channel if the constraint-based route validation determines that the route is valid.

2. A system as claimed in claim 1 further comprising a service manager adapted to receive the requests for service, and exchange admission control signaling messages with edge network elements.

3. A system as claimed in claim 2 further comprising a capacity manager adapted to:
- receive a request for connection capacity between specified network elements;
 - determine if there is available capacity to satisfy the request on an existing communications channel between the specified network elements;
 - if there is available capacity on an existing communications channel, allocate the capacity to the service request, and return a message to the service manager identifying the existing communications channel; and
 - if a communications channel with available capacity does not exist to send a message to the WRM requesting that a channel be set up to satisfy the service request.
4. A system as claimed in claim 1 wherein the channel selection algorithm comprises:
- a route selector adapted to select a route between A and B from a set of routes in accordance with at least one selection criterion; and
 - a wavelength selector adapted to select the at least one wavelength for the communications channel on the selected route.
5. A system as claimed in claim 4 wherein the route selector further comprises a route evaluation algorithm adapted to:

determine a value associated with at least one of a number of optical links in the route; a sum of lengths of the optical links in the route; and, a sum of costs associated with each optical link in the route, for each route evaluated; and use the determined value of each route to select a route with a preferred value.

6. A system as claimed in claim 4 wherein the wavelength selector is adapted to select the at least one wavelength subject to the following constraints:

each of the at least one wavelengths is not indicated to be currently used on any section in the route; and

if regeneration is required, a regenerator is available to regenerate the at least one wavelength in response to regeneration opportunity information.

7. A system as claimed in claim 6 wherein the wavelength selector is further adapted to access a data store in order to retrieve at least one of wavelength utilization information, and regeneration opportunity information.

8. A system as claimed in claim 7 wherein the wavelength selector is further adapted to obtain a distance traversed between A and B over the selected route, and to compare the distance with a predefined regeneration threshold in order to estimate a number (R) of regenerations required for a channel on the

0974097 404304 20642650